United States Department of Agriculture	**Forest Service**	**Wallowa-Whitman National Forest**	**La Grande Ranger District** **3502 Highway 30** **La Grande, OR 97850**

Date: 07/30/2020

Subject: Five Points Fuels Reduction Project – Vegetation Existing Conditions/ Effects Analysis

To: Five Points IDT

The purpose of this report is to describe the existing conditions in the Five Points Fuels Reduction project area.
Information sources used to complete this report include:

- Historic Range of Variation (HRV) analysis
- Propose action development process

PROJECT AREA DESCRIPTION

The Five Points Fuels Reduction project area is approximately 4638 acres in size and located on the Wallowa-Whitman National Forest. The project area is approximately 5 miles northwest of La Grande, Oregon. Elevation ranges from 3175 feet along Five Points Creek to approximately 5300 feet on Mt Emily in the northeast corner of the project area.

Background Information

Historically, the majority of fires in dry mixed conifer forests within the project area occurred in late July to September. Ignitions were predominantly caused by lighting and coincided with the time of year when moisture content of fine fuels was lowest. Wildfires under these environmental conditions would have allowed a substantial amount of surface fuel consumption and produced heat that impacted stand structure and species composition. Frequent surface fires controlled regeneration of fire-intolerant species, reduced density of small-diameter stems, reduced ladder fuels, consumed litter and down wood. Crown fires occurred rarely under these natural disturbance regimes. The structure in these stands generally consisted of open, predominately widely spaced medium to large old trees with continuous low herbaceous understory vegetation.

Changes within the proposed project area over the last century have resulted in stand structures, conifer densities, down woody structure and understory plant communities that deviate from those described historically These shifts in forest structure and composition have been caused by fire exclusion, livestock grazing and past timber harvest practices. Collectively, these altered structural conditions may contribute to increased probability of unnaturally severe wildfires, susceptibility to uncharacteristic insect outbreaks, and drought related mortality. These conditions coupled with the location of the project area between the Five Points Roadless area and populated Grande Ronde Valley also indicate elevated risk of wildfire transmission to areas with high values – residences, private forestlands, Mount Emily Recreation Area and Five Points Roadless area. Additionally, the changes in forest structure and composition have resulted in

loss of large tree open habitat important for an array of wildlife species presenting an opportunity for achieving multiple resource benefits with planned treatments

Potential Vegetation Groups: (PVG) is an aggregation of plant association groups (PAGs) with similar environmental regimes and dominant plant species. Each aggregation (PVG) typically includes PAGs representing a predominant temperature or moisture influence (Powell 2019).

Table 1-PVG Groups within the project area

PVG Groups within the Project area *(Upland Forest Only)*		
PVG	Acres	% of project area
Cold Upland Forest	13	.5
Dry Upland Forest	1,671	36
Moist Upland Forest	2,198	48
Other	707	15.5
Total	4589	100

Cold PVG's make up less than 1% of the project area, and as such will not be a focus for this document. No management actions occur within this PVG.

Moist Upland Forest Group *(48% of the project area)*
These sites are the most productive in the Blue Mountains. Species composition in these stands are a mix of species and size classes with predominantly Douglas fir grand fir, followed by lodgepole pine, spruce and subalpine fir cover types. Early seral species-western larch and ponderosa pine occur within these stands; current stand densities and species composition however is causing intertree competition to occur and having an incrementally larger negative impact on early seral species by decreasing vigor and preventing regeneration. Canopy Cover ranges from 40-70%. Shade tolerant grand fir and to a lesser extent Douglas-fir comprises regeneration in these stands. Understories are dominated by ocean spray and big huckleberry, and twinflower.

The degree of damage from insects- scolytus beetle (*Scolytus ventralis*) and Douglas- fir beetle (dendroctonus pseudotsugae) primarly is variable and depends upon factors such as species composition, tree size, tree vigor and occurrence of root/bole decays or mistletoe. Annosus (heterobasidion annosum) and Armillaria (Armillaria luteoubalina) root rots and Indian paint fungus (Echinodontium tinctorium) were all examined in parts of the moist PVG causing mortality in primarily grand fir. Mortality in many stands is typically less than 5% of the overstory. Mortality is primarily co-dominant or intermediate grand fir exhibiting live crown ratios less than 35% or Douglas-fir with a dwarf mistletoe rating of greater the 3. Tree mortally in known root disease pockets are higher. Stand ages range from 40 to greater than 150 years old for trees greater than 9" DBH.

Dry Upland Forest Group ***(****36% of the project area)*

These sites are low to moderate in productivity. Past activities and fire exclusion have led to an increase in the understory components of these stands, which has led to an increase of ladder fuels into the larger trees. Historically, many of these stands were dominated by shade intolerant species-western larch and ponderosa pine maintained by fire. Species composition in these stands are now a mix of grand fir, Douglas-fir and ponderosa pine with some lodgepole, Engelmann spruce and western larch of poles to large sized trees. Understories are dominated by seedlings and saplings mostly of grand fir and Douglas-fir with pinegrass and sedges. Mortality in most stands is less than 5 % of the overstory. Stand ages range from 30 to greater than 150 years old for trees greater than 9" DBH. Canopy cover ranges from 10% to 60% with an average of 45%. Natural disturbance regimes would have created stands with more open structural conditions dominated by large diameter seral species with scattered groups of seedlings and saplings underneath. Active insects included western pine beetle, mountain pine beetle, fir engraver beetle and diseases, primarily dwarf mistletoe, were observed in these stands. Understories are dominated by snowberry, pinegrass, and elk sedge.

Insect/ Disease Activity

Insects: The degree of damage from insects is variable and depends upon factors such as species composition, tree size, tree vigor and occurrence of root/bole decays. Mountain Pine Beetle, larch casebearer moth, Western Pine Beetle, Fir Engraver, and Balsam Wooly Adgelid populations have shown a presence in the planning area within the last few years. Stands have pockets of beetle kill, recent attacks and breading populations. Fir engraver and Balsam Wooly Adgelid activity has been on the rise the last few years and is activity causing mortality in grand fir.

Insect Activity (2015-2019)

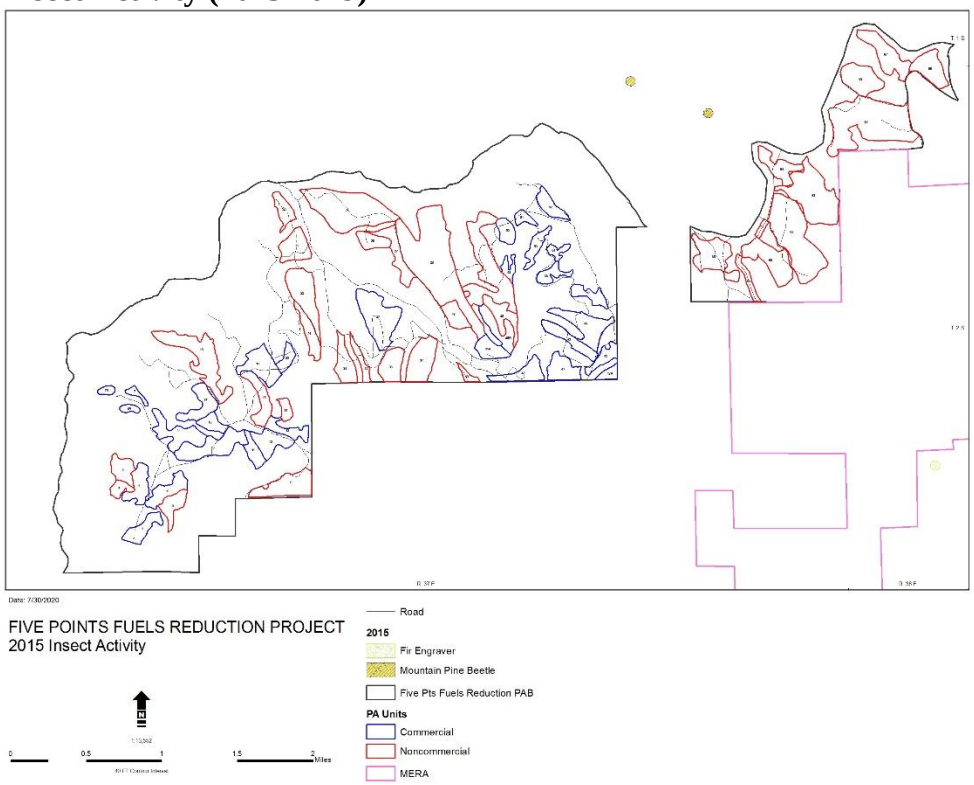


Figure 1-2015 insect activity

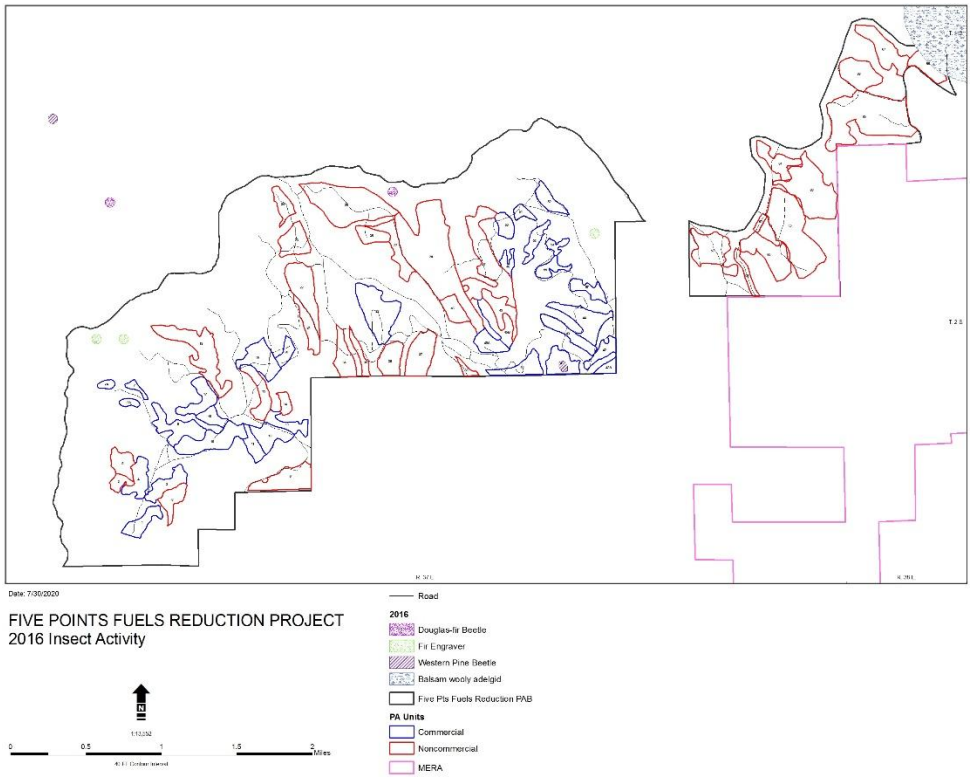


Figure 2-2016 insect activity

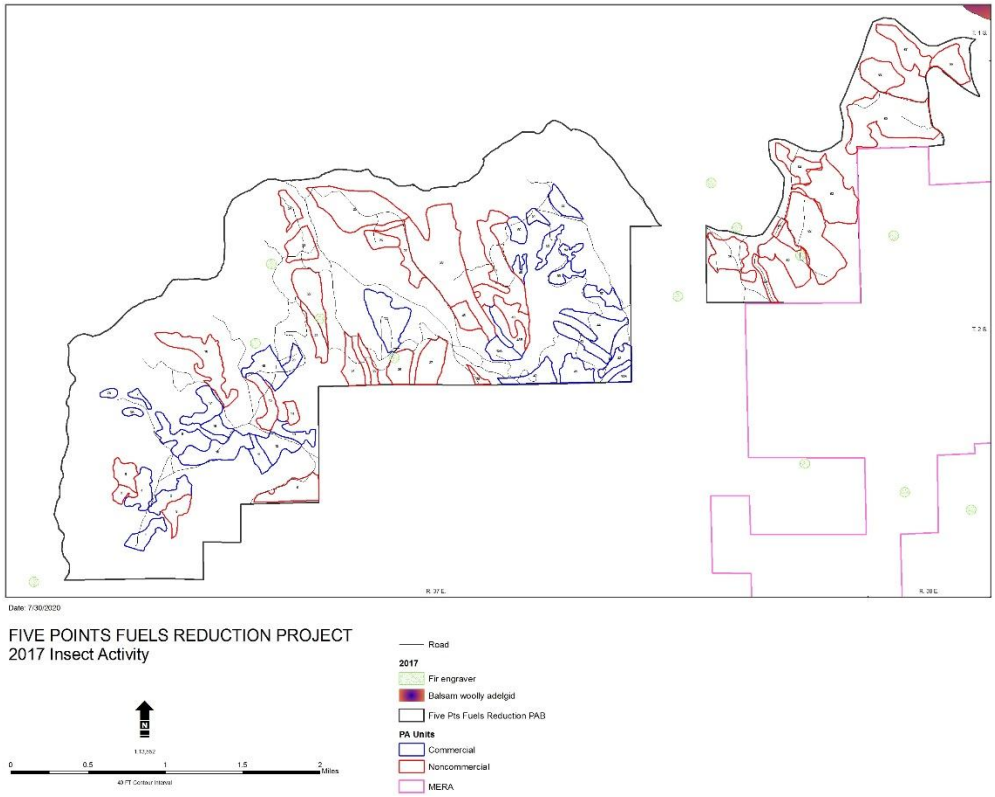


Figure 3-2017 insect activity

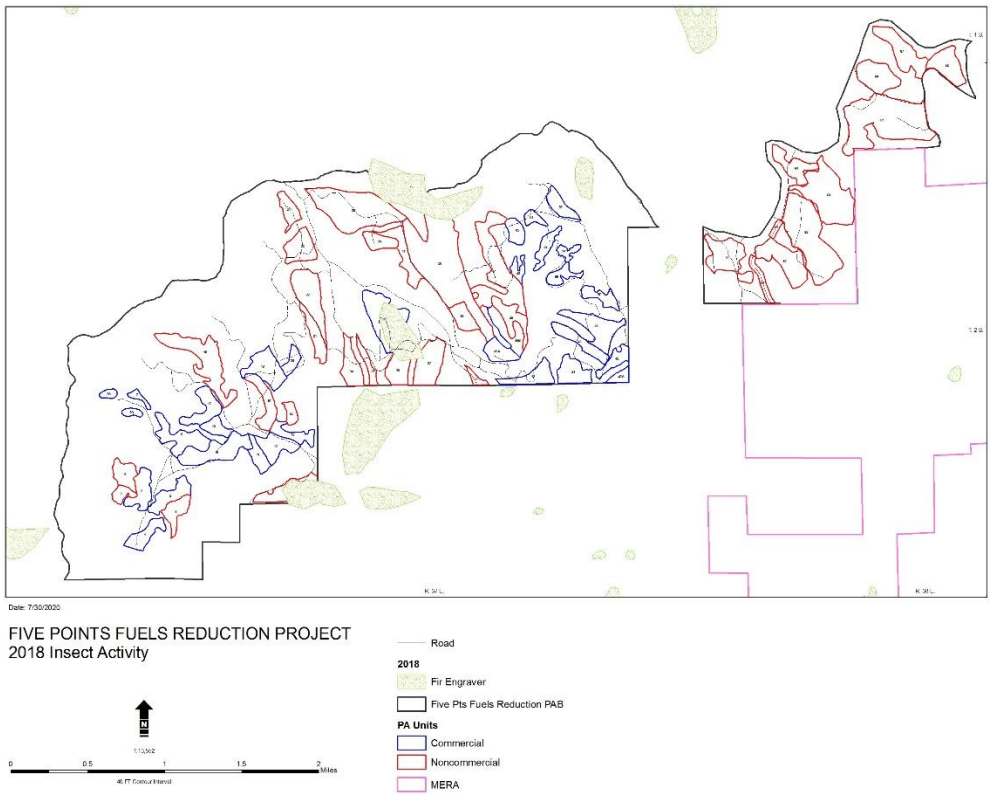


Figure 4-2018 Insect Activity

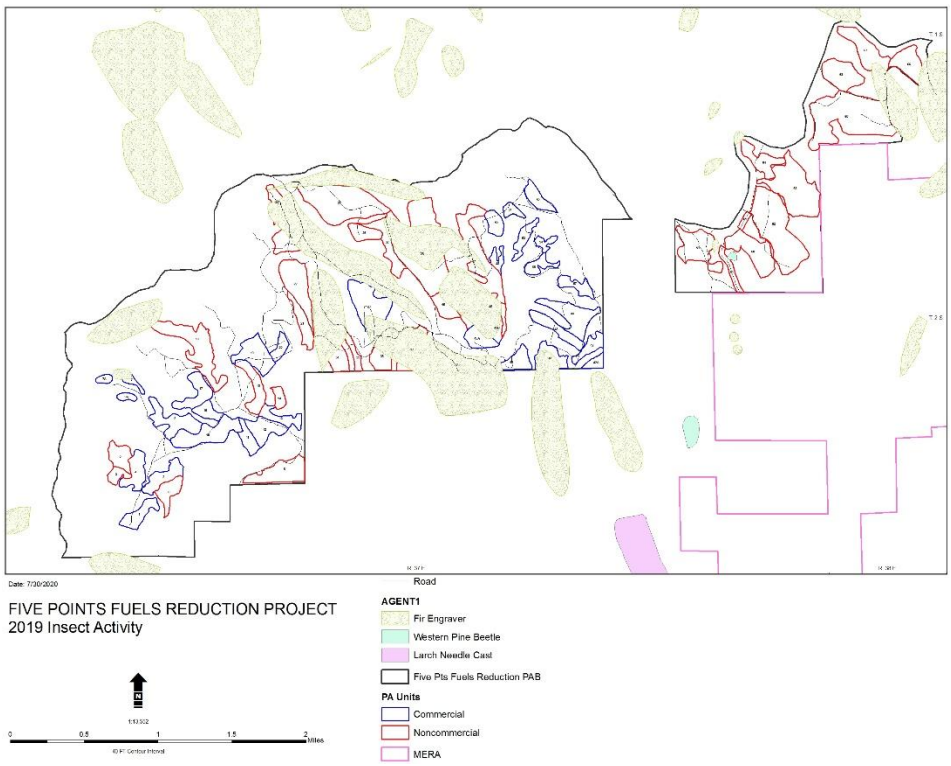


Figure 5-2019 insect activity

Diseases: Tree diseases cause reduced growth rates, mortality, defect and decay. Incidence and severity of diseases in the Five Points project area are a combination of vegetation, successional stage, and disturbance (Scott, 1996). Major diseases in the area include root diseases (annosus and armillaria), Indian paint fungus, lodgepole cankers, heart rots and dwarf mistletoes. Infected trees can have a reduction in growth, topkill, premature mortality, susceptibility to other biotic agents and predisposition to crown fire (Schmitt, 1994). Overstocked stand conditions increase the risk of further loss of tree species.

HRV Analysis

Historic Range of Variation (HRV) is meant to reflect ecosystem properties free of major influence by Euro- American humans, providing insights into ecosystem resilience- what an ecosystem is capable of, how historical disturbance regimes functions and inherent variation in ecosystem conditions and processes (USDA Forest Service 1997). HRV are useful to guide management because forest were historically resilient to drought, insects, pathogens and severe wildfire.

Table 2- HRV Analysis for the Five Points Watershed (38,403 acres)

	Potential Vegetation Group (PVG)					
	Cold Upland Forest		Moist Upland Forest		Dry Upland Forest	
Forest Structure stages	Range of Variation (%)	Existing Condition (%)	Range of Variation (%)	Existing Condition (%)	Range of Variation (%)	Existing Condition (%)

Stand Initiation	20-45%	43.0	20-30%	11.39	15-30%	18.77
Stem Exclusion	15-30%	2.6	20-30%	6.90	10-20%	10
Understory Re-initiation	10-25%	48.1	15-25%	63.22	0-5%	61.21
Old Forest Single Strata	5-20%	0.0	10-20%	0.02	40-65%	0.19
Old Forest Multi Strata	10-25%	6.2	15-20%	19.68	1-15%	10.65

Dry PVG comprises 36 % of the project area. The HRV analysis identifies discrepancies between the forest structure current conditions when compared to what was historically expected. For Dry PVG, significant discrepancies in forest structures occur within the understory re-initiation stage (over represented), and old forest single strata stage (under represented). Moist PVG comprises 48% of the project area. Significant discrepancies occur on all Moist PVG structural stages except Old Forest multi strata. Stand initiation, stem exclusion, old forest single strata structure stages are all under represented, while understory re-initiation stage is over represented.

Historic Photos near the Project Area

Below are photos to illustrate the historical representation (1937) of forest character for the Five Points Fuels Reduction Project. These photos were taken near the project area off of Canyon Butte, on the Umatilla National Forest.

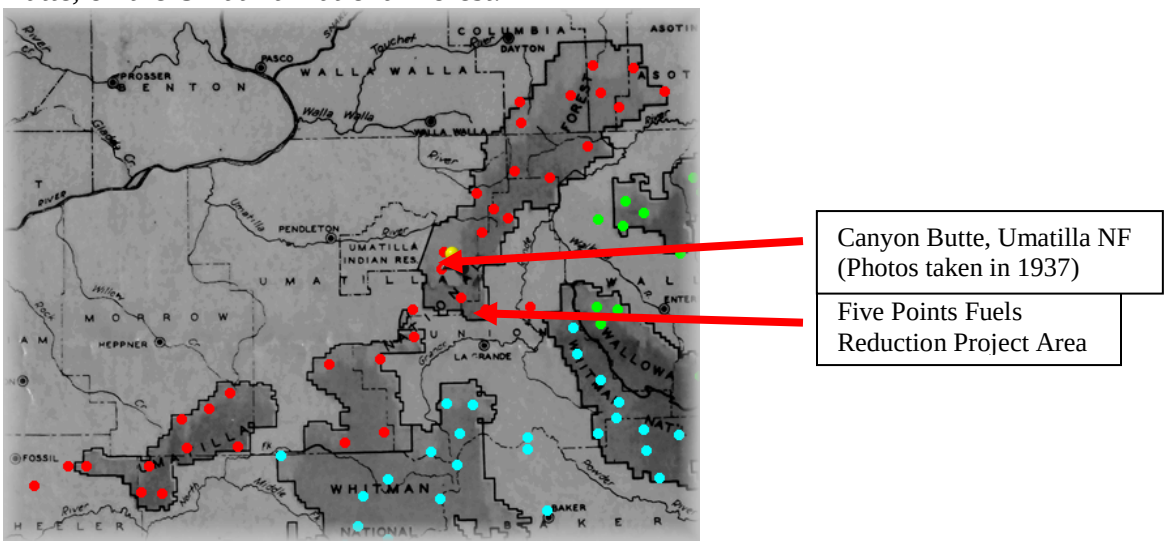


Figure 6- Map of Northeast Oregon.

Figure 7- Canyon Butte Lookout (1937) Looking North

Figure 8- Canyon Butte Lookout (1937) Looking South East

Figure 9- Canyon Butte Lookout (1937) Looking South West

Figures 8-10 depict historical forest conditions in the Blue Mountains. Wildfire historically maintained a patchwork of burned and recovering vegetation in a variety of fuel conditions, seral stages and patch sizes. This patchwork landscape spatially interrupted conditions supporting large fire and would influenced future events frequency, size and severity. This created a natural resilience mechanism for forest by reducing surface and ladder fuels, increasing the height to live crowns, decreasing crown density, favoring early seral species, favoring medium and large sized older trees, and favoring patchy tree and surface fuel cover (Stine et al. 2014)

Climate

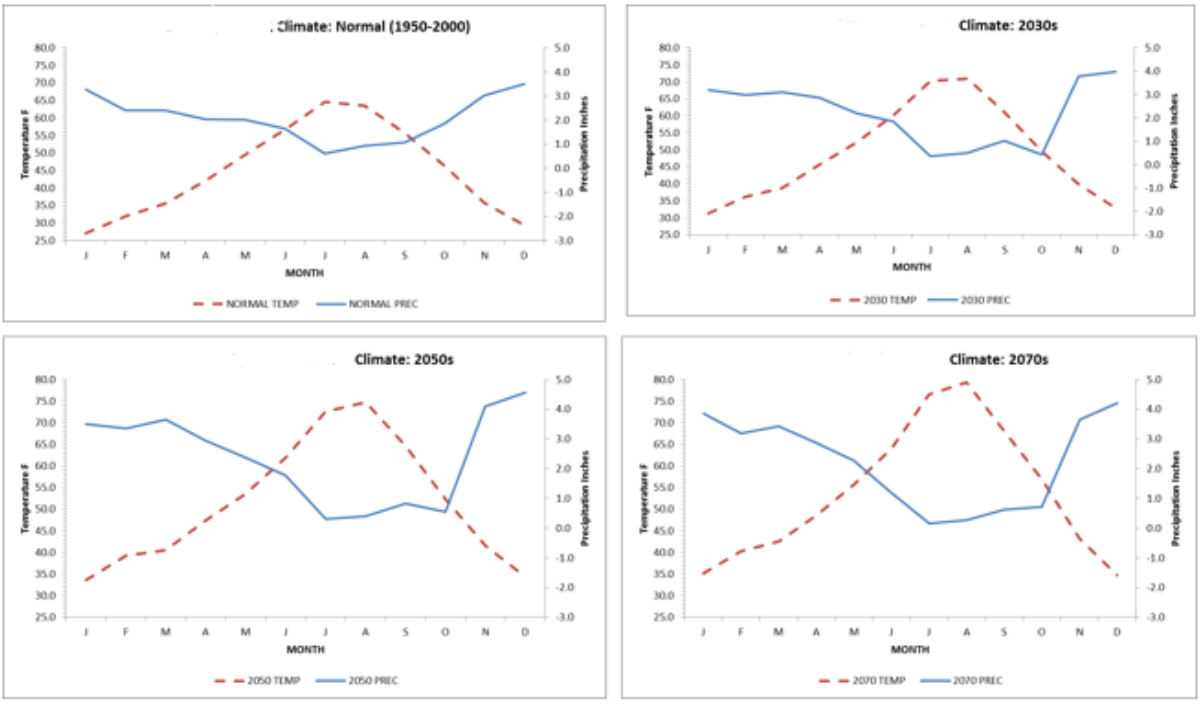


Figure 10-Walder Climate Diagram of the Five Points Fuels Reduction Project

Above depicts a Walter climate diagrams to compare seasonal relationships between precipitation and temperature encompassing the Five Points Fuels Reduction Project. The diagrams enable biologically meaningful comparisons of these two interacting components of climate which are expected to change relative to "normal" (1950-2000) or baseline climate of the recent past. The relationship between temperature and precipitation consistently diverges from baseline patterns in the project area with important implications to forest health. Length and magnitude of the seasonal water deficit are expected to increase. Accordingly, the growing season is expected to become hotter, drier, and longer. Precipitation during the water surplus period is expected to increase. However, precipitation during this period is more likely to be received, under warmer temperatures, as rain instead of snow. Moreover, snow that does accumulate and contribute to the snowpack has a greater likelihood of melting during predicted periods of winter warming (Halofsky et al. 2017)

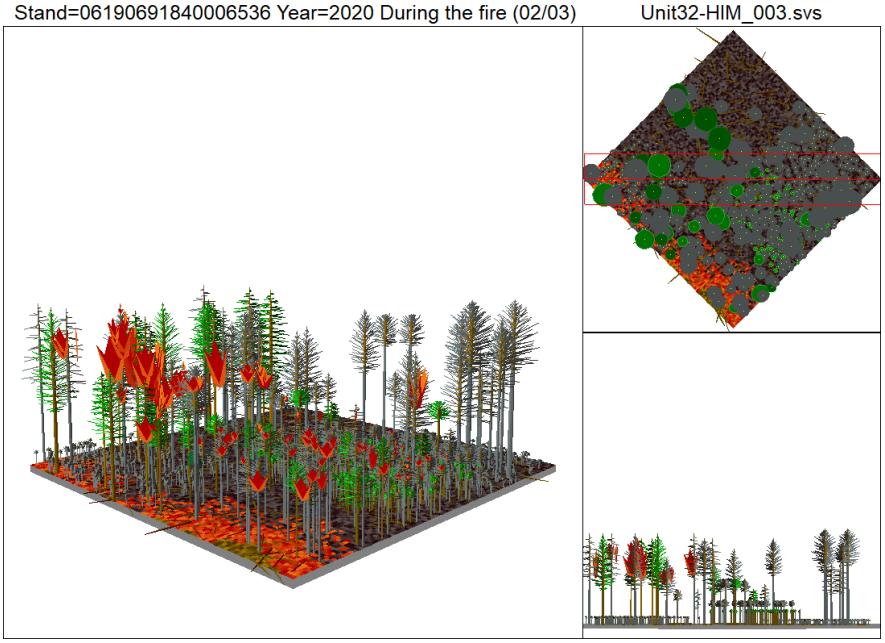
Reduced snowpack will further exacerbate the moisture stress trees experience during the longer, drier, growing season. Given the predicted divergence from baseline climate patterns of the recent past, the water supplying capacity and, accordingly, the carrying capacity across the

project area is expected to diminish in the coming decades. The lower limit of full site occupancy as well as the zone of imminent competition mortality will likely be lower reflecting predicted changes in temperature and precipitation in the coming decades.

Under greater competition for declining soil moisture, reduced oleoresin exudation pressure can be expected which will adversely impact the ability of trees to resist bark beetle attacks. Tree mortality will likely increase due to lower available soil moisture during the growing season. Moreover, fire regime will likely become more frequent and severe. Year-to-year variability in monthly temperature and precipitation is projected to increase significantly in the decades to come. Climate changes over the next several decades are likely to alter site potential within the project area.

Risk of disturbance

Extensive logging, live-stock grazing, and fire suppression has resulted in a decline in large and old trees, and increased in relative abundance of fire intolerant species and an increase in overall forest density have created a vulnerability to disturbances such as fire or insect outbreaks. Though these disturbances naturally occur in the Blue Mountains, stands existing conditions currently have low resiliency against them as illustrated by the forest vegetation simulator (Figure 11). Directional climate change effect on disturbances will increase their frequency and severity (Johnson 2017).



Risk of Disturbance (insect /fire)
Canopy Cover: (0-25%)
Basal Area: (0-60)
Stand Density Index (0-108)
Forest Structure: Stand initiation / Understory Re-initiation

Figure 11- FVS modeling Disturbance (fire) in existing conditions during droughty period. Current stand conditions are conducive to crown fire resulting in high fire severity, resulting in a stand replacing fire. This reduces the quantity of late and old forest throughout the project area which is important for wildlife species and creates hazardous conditions to firefighters.

Proposed Action

Treatments proposed under this project will be designed to move stands form their current structure and development trajectory to conditions that more closely incorporate natural disturbance regimes. Strategies for restoring

forest structure and function include thinning trees and prescribed burning of surface fuels to reduce potential fire intensity and severity.

Long term vegetation management objectives for the analysis area includes:

1. Restoring and maintaining vegetative conditions and wildlife habitats consistent with the historic range of variation in terms of vegetation composition, structural stages, and disturbance patterns (fire regimes).
2. Creating and maintaining fuel profiles within the project area that minimize risk to firefighter safety, public, adjacent private and county lands, natural resources, and developed lands (ex. Private residences/structures, Mount Emily Recreation Area) in the event of a wildfire.
3. Creating and maintaining vegetative conditions that are more resistant and/or resilient to anticipated increases in fire frequency and severity due to climate change.

Development
Vegetation management is proposed within the project area in order to achieve the objectives. A comprehensive restoration approach helps determine where management is appropriate both geographically and ecologically. The follow pertains to each management unit:

1. **Treatment area occurs on previously managed stands.**
   Appendix A- a map of the proposed treatments with past commercial and non-commercial activities show that the majority of proposed action treatments occur within a stand that has been previously commercially harvested or non-commercially harvest and/or a fuels reduction treatment. Units that appear to have no previous management have large diameter stumps throughout the unit indicating past management that was not recorded by the Forest Service. Historically selective logging targeted removal of large diameter early seral species.

2. **Treatment areas are adjacent to existing open and closed roads for unit access.**
   No specified roads will be required to implement the proposed action. Utilizing current open roads, opening closed roads and constructing temporary roads will adequately provide access to the proposed actions. Proposed management unit's proximity to a major roads prevent these areas from functioning as satisfactory security or forage habitat for big game species; and treatment would not change this. The Five Points Fuels Reduction Project Area was determined to have sufficient cover and foraging habitat for big game species away from roads, treatment for this reason is not proposed in these areas. In addition, these stands are at an elevated risk to fire ignition due to their proximity of heavily-used 3-season road compared to other areas within the project area. Treatments aimed to create conditions that are not favorable to transmitting ground fire into the crowns and will be helpful in promoting low fire severity within strategic fuel breaks minimizing risk to firefighter safety. Canopy bulk density value is from Powell (2010), and represents the value (.05 kg/m^3) under which a crown fire is not likely to occur. Treatment will create conditions that create this type of fire behavior.

3. **Treatment areas occur on soil types and topographic positions that are likely to experience droughty conditions into the future.**
   Appendix B- Map of the Droughty Soil Probability identifies soil types that have a thin organic layer, a high bulk density, and of a parent material that inherently decreases available water capacity. Available water capacity is the maximum amount of plant available water soil can provide. Areas with droughty soil probability greater than 60% will not be able to provide water for plants during drought. Lack of available water decreases plant vigor and will reduce the plants ability to defend itself from insect attacks. Areas within the project area that have a high probability of having no available water in the soil during drought suggest less vegetation is appropriate. These include both Dry and Moist PVG. Drought tolerant species have a competitive advantage growing on these soil types than other species because they will be able to maintain vigor throughout drought periods (summer months) enabling them to protect themselves against insects attacks.

4. **Treatment areas occur in fire regime condition class 1 or 2. Treatment is aimed at creating conditions that are conducive to fire behavior that is low severity.**

Figure 12- large diameter stumps (circled above) from early seral species are present throughout the treatment units. These stumps indicate the historical species composition structure that occurred and disturbances the stand had resilience to.

Appendix C, protrays the historical fire regimes for this area. The majority of commerical treatments occur in areas where the expected fire behavior is high frequency and low severity indicating Dry PVG. Treatment areas in expected fire regime condition class 3 are directly adjacent to Dry Upland Forest, with expected fire regime 1 and 2. Existing remnant legacy fire-tolerant western larch and ponderosa pine within Moist PVG units further illustrate that large-diameter, widely-spaced, early-seral-species comprised the stand's historical composition, density and structure as a result of past disturbance (fire). Furthermore, the units in the project area are at a higher ignition risk due to their close proximity to a major road and because of this may expericence more frequent fire then areas away from roads.

Johnston (2017) explains that "frequent fire across the landscape historically reduced tree biomass on moist sites to equal or less biomass as less productive sites [Dry PVG's]". Fire exclusion has caused more productive grand fir potential forest to experience significantly greater relative change, in regards to density, than ponderosa pine dominated stands with intact old-growth structure in the southern Blue Mountains. The Five Points fuels reduction project area has been simplified by the cumulative effects of past management and fire suppression, creating uncharacteristic regeneration conditions to what historically occurred, including Douglas-fir (mid-seral species) dominance with some grand fir (late seral). Focusing on

a future Old Forest Single Strata structure for Five Points project areas is better aligned with climate change adaptation recommendations, increased potential fire ignition exposure, and allows the stand to function largely as the Dry Upland Forest environments surrounding it.

5. **Management in dry pine dominated forest is also appropriate for both dry and moist mixed conifer forest.**
   Protecting old trees, reducing surface fuels, reducing overall forest density, and shifting composition from fire intolerant composition from fire intolerant to fire tolerant species is important in both dry pine dominated forest and moist and dry mixed conifer forest. Wildlife use and ecological processes that were historically characteristic of moist mixed conifer forests were compatible with lower densities and basal area than exist today (Margolis and Malevich, 2016). Moist and dry mixed conifer forest experience similar fire disturbance regimes as ponderosa pine stands in thje past and are likely to experience similar fire disturbance regimes in the future (Johnson, 2017). In addition Directional climate change is likely to impose many of the same enviromental constraints on moister sites as were historically experienced by dryer sites.

6. **Dry forest management actions may be used to support the habitat objectives or enhance conservation relative to a habitat attribute or focal species and used as a habitat conservation strategies.**
   The use of a suite of focal species provides an efficient and more comprehensive tool to support ecosystem management because it ensures that conservation is directed at the range of important habitat conditions for birds within the ecosystem. For the Five Points Fuels Reduction project three avian focal species have been identified (White-headed woodpecker, Flammulated Owl, Lewis's woodpecker) which favor dry forest habitats. To support these species restoration stratigies will be applied to enhance dry forest habitats. Desired conditions in dry forest are: large tree, single-layered canopy with an open, park-like understory dominated by herbaceous cover with scattered shrub cover and pine regeneration. Restoring dry forest to promote these conditionswill postitvly impact conservation statigies for theses focal species (Altman and Bresson, 2017).

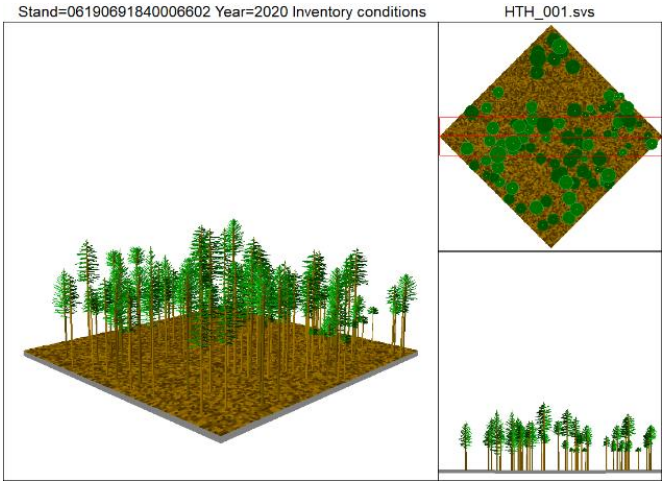
Treatment Descriptions

HTH Variable Density Thinning

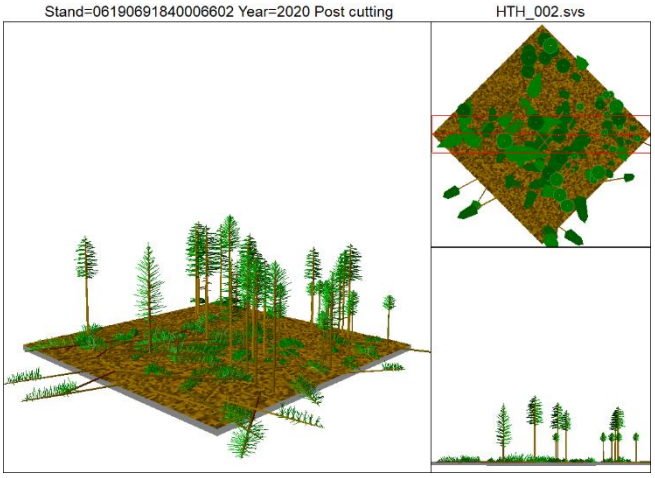
Variable density thinning from below prescription is designed to reduce competition for site nutrients and concentrates growth potential on residual trees. Three goals of this prescription are: 1. perpetuating old forest conditions threatened by severe fire from high density of fuels, 2. bringing forest conditions to higher resilience to drought and insect attacks, 3. accelerating development of structural complexity and old-growth characteristics in young forest stands. Thinning can improve growing conditions, tree quality, resistance to severe wildfire and the economic value of the stand. Thinning will not necessary result in a uniform and homogenous stand. Species, sizes, reducing ladder fuels and spacing of the overstory and understory trees will vary to achieve desired results with heterogeneous spacing distribution (Tappeiner, 2013). A Thin From Below is accomplished by removing smaller over topped trees and some poorly crowned intermediates/ co-dominants which compete for site resources and create ladder fuels

into the crowns of the best quality trees which would remain on site. The species composition of a stand can also be influenced by thinning, e.g. depending on which tree species are cut and which are retained. This treatment will create stumps, slash and soil disturbance that will be visible for foreground views. These effects will be minor, lasting the first few years only. As regrowth of shrubs and grasses occur these effects will be significantly reduced.

Forest Vegetation Simulator (HTH Treatment on a Dry UF SE Stand- Modeling Group 1)



Existing Conditions
Canopy Cover: 35 %
Basal Area: 90
Stand Density Index: 149
Species Composition: Douglas-fir (39%), ponderosa pine (61%)
Forest Structure: SE
QMD: 12
Canopy Bulk Density: .05



After Commerical Harvest
Canopy Cover: 18%
Basal Area: 42
Stand Density Index: 64
Species Composition:
Douglas-fir (45%), ponderosa pine (55%)
Forest Structure: UR
QMD: 15.1
Canopy Bulk Density: .019

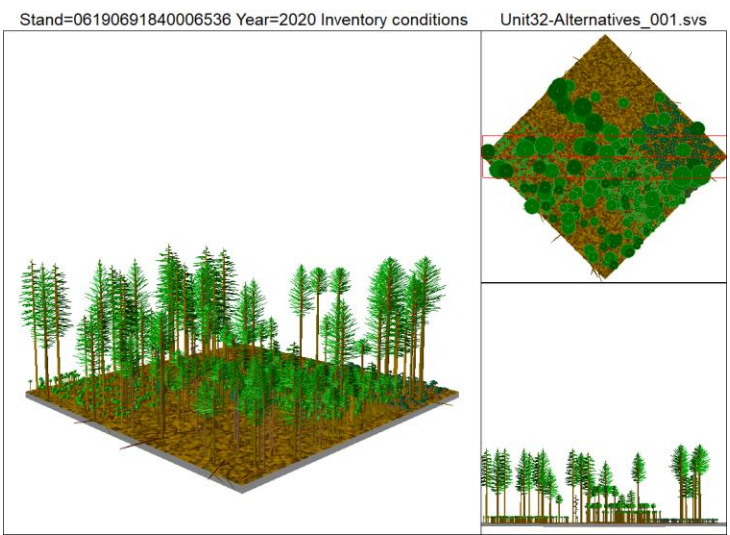
Proposed Action

Unit Number	Rx Detail	Acres	PVG	Structure	Structure post RX	FRCC	Drought Probability (%)
2	HTH-OFSS	18	DRY UF	OFMS	OFSS	1	80-100
1	HTH	15	DRY UF	SE	UR	1	80-100
4	HTH-OFSS	18	DRY UF	OFMS	OFSS	1	80-100
7	HTH-OFSS	4	DRY UF	OFMS	OFSS	1	80-100
9A	HTH	4	DRY UF	SE	UR	1	80-100

10	HTH	33	DRY UF	SE	UR	1	80-100
11	HTH	11	DRY UF	UR	UR-OFSS	1	80-100
12	HTH	19	DRY UF	SE	UR	1	80-100
17	HTH	19	DRY UF	SE	UR	1	80-100
16	HTH-OFSS	10	DRY UF	OFMS	OFSS	1	80-100
42	HTH	8	DRY UF	UR	UR-OFSS	1	80-100
43	HTH	17	DRY UF	UR	UR-OFSS	1	80-100
45A	HTH-OFSS	14	DRY UF	OFMS	OFSS	1	80-100
48	HTH	6	DRY UF	UR	UR-OFSS	1	80-100
50	HTH	10	DRY UF	SE	UR	1	80-100
52	HTH-OFSS	13	DRY UF	OFMS	OFSS	1	80-100
51	HTH-OFSS	6	DRY UF	OFMS	OFSS	3	80-100
55	HTH	10	DRY UF	SE	UR	3	80-100
57	HTH	11	DRY UF	SE	UR	3	80-100
TOTAL		**246**					

HIM Improvement Cut

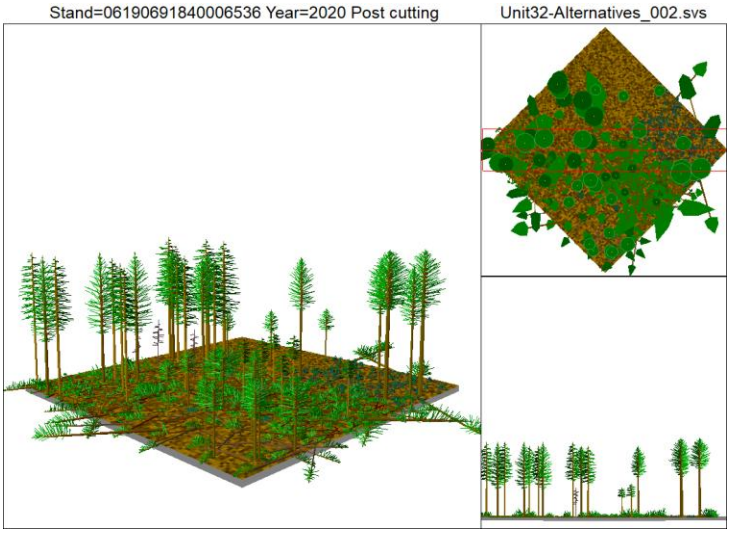
This prescription intent is to enhance early seral species composition within the stand, improving vigor and form of existing early seral species, reduce disease damage, and creating forest structure that is alined with HRV. An emphasis will be made to retain fire- and drought- tolerant trees of medium and large diameters to provide a backbone of wildfire and climate-tolerant landscapes and wildlife habitat while providing essential seed sources for early seral species regeneration where they currently do not exist. Trees of different size classes will be retained, residual stocking levels will be near the lower management zone except for regeneration focus areas. In these areas, stocking levels will be below the lower management zone for assoicated plant groups to allow for site conditions that favors regeneration of early seral species (Barrett 1979). Reducing stocking levels below LMZ would occur when soil evidence supports lower stocking rates, e.g. presence of mollisol soils suggest that a stand historically was dominated by grasslands, with sparse and widely spaced individual trees or localized patches of trees; absence of fire disturbance has allowed more trees to grow into previously open grasslands. Cutting intensity will vary for different areas dependent on both biotic and abiotic factors. Grand fir will not be managed in these stands due to the prevalence of annosus root rot- areas wtih abundent grand fir may be regeneration focus areas. This prescription creates a natural visual appearance by moving conditions toward its historical range, opening stands to a lower stocking level, and toward a species composition that is within the historical range. The effort to move conditions toward the historical range usually contributes to the improvement of scenic stability and wildlife



Forest Vegetation Simulator (HIM Treatment on a Moist UF OFMS Stand- Modeling Group 2)

<u>Existing Conditions</u>
Canopy Cover: 53 %
Basal Area: 125
Stand Density Index: 294
Species Composition: Douglas-fir

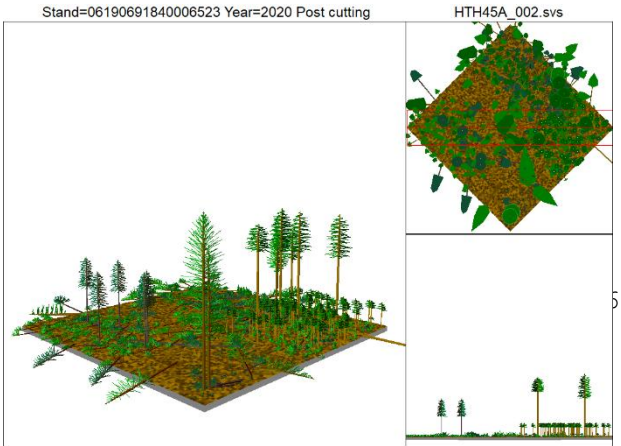
(63%), grand fir (8%), lodgepole pine (4%), ponderosa pine (25%)
Forest Structure: OFMS
Snags: 1/ acre
QMD: 5.4
Canopy Bulk Density: .095



<u>After Commerical Harvest</u>
Canopy Cover: 25%
Basal Area: 64
Stand Density Index: 97
Species Composition: Douglas-fir (62%), ponderosa pine (38%)
Forest Structure: OFSS
Snags:
QMD: 16
Canopy Bulk Density: .03

Forest Vegetation Simulator (HIM Treatment on a Dry UF OFMS Stand- Modeling Group 2)

<u>Existing Conditions</u>
Canopy Cover: 43 %
Basal Area: 91
Stand Density Index: 231
Species Composition: Douglas-fir (45%), grand fir (21%)ponderosa pine (34%)
Forest Structure: OFMS
QMD: 8.5
Canopy Bulk Density: .062



<u>After Commerical Harvest</u>
Canopy Cover: 20%
Basal Area: 42
Stand Density Index: 75

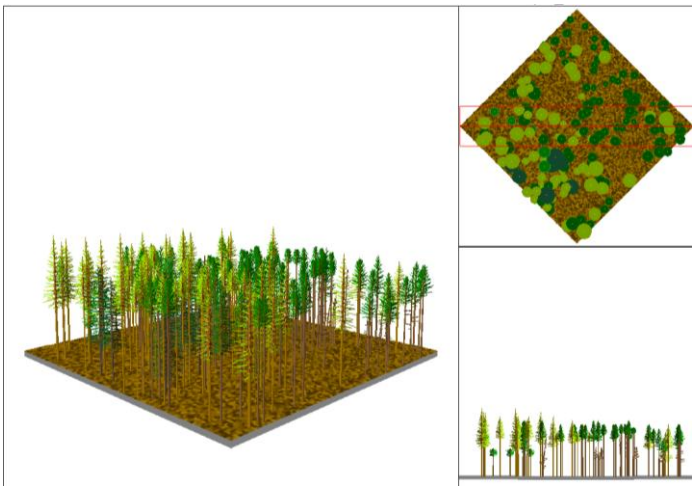
Species Composition:
Douglas-fir (23%), ponderosa pine (77%)
Forest Structure: OFSS
QMD: 14.2
Canopy Bulk Density: .013

Unit Number	Rx Detail	Acres	PVG	Structure	Structure post RX	FRCC	Drought Probability (%)
19	HIM-OFSS	26	DRY UF	OFMS	OFSS	3	80-100
20	HIM	8	DRY UF	UR	UR-OFSS	3	80-100
42	HTH	8	DRY UF	UR	UR-OFSS	1	80-100
40	HIM-OFSS	17	DRY UF	OFMS	OFSS	1	80-100
53	HIM	11	DRY UF	UR	UR-OFSS	1	80-100
45B	HIM	18	DRY UF	UR	UR-OFSS	1	80-100
TOTAL		**88**					

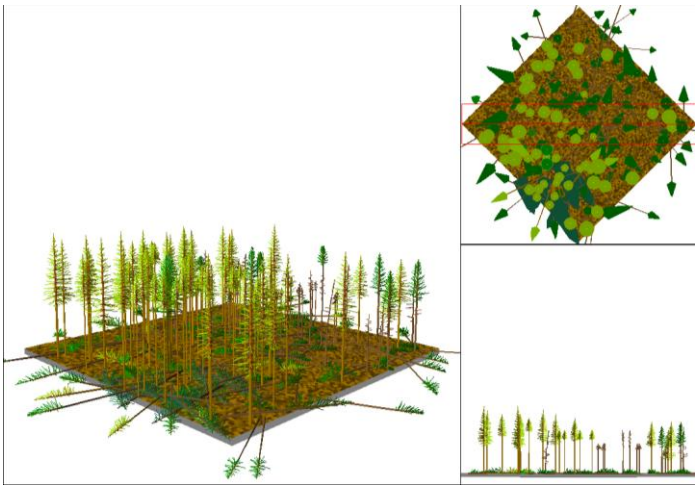
PCT Precommerical Thin

Thinning of smaller diameter selected trees in a young stand to stimulate the growth of the remaining trees. Cutting may be accomplished by manual or mechanical (slash buster) methods. The primary effect of early PCT work would be to control whether wood volume and growth are concentrated on few large, stable trees or spread over many small, unstable trees (Schaedel, M.S. et al., 2017). The positive effects of PCT are similar to thinning, however, no commercial products would be removed. Slash may be treated through slash busting, hand-piling and burning which reduces the visual effects to the casual viewer, or is lopped up into small sections and scattered throughout the stand at an average height of 2' above the ground to help with nutrient cycling. Pre-commercial thinning contributes to scenic stability by reducing stand densities and removing ladder fuels that put scenic attributes at risk to potential wildfires.

Forest Vegetation Simulator (PCT Treatment on a MOIST UF SE Stand- Modeling Group 3)



<u>Existing Conditions</u>
Canopy Cover: 45 %
Species Composition: western larch (45%), subalpine fir (21%), western white pine (34%)
Forest Structure: SE
QMD: 3
Canopy Bulk Density: .054



Existing Conditions
Canopy Cover: 26 %
Species Composition: Western larch (80%), western white pine (20%)
Forest Structure: UR
QMD: 6
Canopy Bulk Density: .02

Unit Number	Rx Detail	Acres	PVG	Structure	Structure post RX	FRCC	Drought Probability (%)
6	PCT	30	MOIST UF	UR	UR	3	60-80
18	PCT	47	MOIST UF	UR	UR	1	80-100
23	PCT	21	MOIST UF	SE	UR	3	0-20
26	PCT	12	MOIST UF	SE	UR	3	80-100
46	PCT	13	MOIST UF	UR	UR	3	0-20
27	PCT	19	MOIST UF	SE	UR	1	0-20
22	PCT	11	MOIST UF	UR	UR	3	0-20
21	PCT	15	MOIST UF	UR	UR	3	0-20
34	PCT	19	MOIST UF	UR	UR	3	0-20
35	PCT	8	MOIST UF	UR	UR	3	0-20
36	PCT	19	MOIST UF	OFMS	OFSS	1	0-20
37	PCT	29	MOIST UF	OFMS	OFSS	1	0-20
38	PCT	4	MOIST UF	UR	UR	3	0-20
49	PCT	18	MOIST UF	UR	UR	3	80-100
66	PCT	23	MOIST UF	SE	UR	3	20-40
67	PCT	29	MOIST UF	SE	UR	3	0-20
68	PCT	27	MOIST UF	SE	UR	3	0-20
58	PCT	32	MOIST UF	SE	UR	3	40-60
62	PCT	74	MOIST UF	SE	UR	3	40-60
65	PCT	92	MOIST UF	UR	UR	3	0-20
64	PCT	19	MOIST UF	SE	UR	3	0-20
63	PCT	58	MOIST UF	SE	UR	3	20-40
60	PCT	33	MOIST UF	SE	UR	3	40-60
59	PCT-	8	MOIST UF	SE	UR	3	20-40

	Roadside						
61	PCT-Roadside	3	MOIST UF	SE	UR	3	40-60
TOTAL		**663**					

3	PCT	7	DRY UF	OFMS	OFSS	1	80-100
5	PCT	14	DRY UF	OFMS	OFSS	1	80-100
15	PCT	19	DRY UF	OFMS	OFSS	1	80-100
14	PCT	6	DRY UF	UR	UR	1	80-100
24	PCT	12	DRY UF	SE	UR	3	0-20
25	PCT	72	DRY UF	SE	UR	1	80-100
28	PCT	119	DRY UF	OFMS	OFSS	1	80-100
47	PCT	60	DRY UF	OFMS	OFSS	1	80-100
8	PCT	14	DRY UF	UR	UR	1	80-100
TOTAL		**325**					

Treatment Effects

Within treatment units, treatments would create conditions that:

- favor establishment of multi-storied stands
- revert old forest multi storied stands to old forest single storied stands
- favor establishment of larch (Johnson 2017)
- remove ladder fuels and reduce crown densities
- reduce densities and alter species composition

Moist PVG Units*:* Species composition in moist upland forest are over represented by grand fir, Therefore an emphasis on increasing other species distribution in stands back to the historic range of variation would be an objective, especially those species that are drought, insect, disease and fire resistant. In moist upland forest, grand fir was typically 15-30% of the stand composition (Powell, 2019); grand fir is overrepersented in the 5 points project area in both regeneration and the overstory. After treatment residual trees would be healthy, vigorous and display live crown ratios (LCR) of greater than 40%, with less mistletoe infected western larch.

Treatment would create forest with canopy openings that reflect fine-scale disturbances and increase resiliency to insect, disease, fire and climate change (Graham and McCaffrey, 2003). Proposed treatments would create conditions that would encourage higher amounts of early seral trees species regeneration for their drought and fire tolerance, by producing visible sky that would enable western larch to be competitive with grand fir, lodgepole pine, and subalpine fir regeneration (Jain et al. 2006). Post-harvest prescribed burning of these stands would play an important role in maintaining them.

Decreased stand density would improve regeneration of shade intolerant species (Cochran et al., 1999) and provide better resilience to fire, insects and disease. There would be a species retention preference for drought and fire tolerant species that can provide hard snags. High vigor residual trees in stands in the understory re-initiation or stem exclusion structural stage, would move at a faster pace into the old forest single (OFMS) and multi-stratum (OFSS); as dimeter

growth of residual trees would increase (Cochran & Seidel, 1999; Cochran & Dahms, 1998). Intermediate treatment in moist OFMS stands would stay as OFMS. Openings would occur inside the stand where low vigor trees were removed, creating greater horizontal and vertical complexity in the stand; along with moving stands towards more seral species which are underrepresented on the landscape.

Dry PVG: stands are over represented by grand fir and Douglas fir. Treatments would reduce grand fir and Douglas-fir over representation and provide more disease resistance and structures more consistent with natural disturbance regimes (Schmidt, 1994; Scott, 1996; Powell, 2014). After treatment residual trees would be healthy, vigorous and display live crown ratios (LCR) of greater than 40% and would begin to provide more open conditions dominated by ponderosa pine, Douglas-fir, and western larch. The effects of potential climate-induced change would be minimized by reducing densities and minimizing grand fir. Post-harvest prescribed burning of these stands would play an important role in maintaining them. Densities levels, as well as, the amount of understory in the stands would be reduced as burning is conducted. Treatments would reduce the risk of insect and disease problems and provide stocking control for 20-30 years. Natural underburning conducted in fire- dependent ponderosa pine and fire- tolerant mixed conifer stands would help to perpetuate natural disturbance regimes.

Two major changes expected from climate change are more severe fire and extensive outbreaks of insects and diseases (Halofsky et al. 2017). Climate change is elevating the level of insect and disease caused mortality and impacting the size and extent of wildfires. In response to those changes the strategy is to develop more resilient and resistant forests. Changing species composition from one susceptible to insects and diseases and fire to one more resistant and resilient would provide for sustainability of forests. A healthy forest has a majority of trees that are vigorous and resistant to insects and disease and have the ability to sustain itself when affected by wildfire.

Intermediate treatment in dry OFMS stands would convert to OFSS stands, which is appropriate because dry stands that experienced frequent surface fires (Source). OFSS structure stage is below HRV for the two eagle project area.

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